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After we get in about 300 or 400 fathoms, which is reached by quite a rapid falling off at the end of the plateau or gently inclined plane, we find the fine sand or mud composed of Foraminifera which has so great an extension in deep water. This we make the end of our lines at present. The dredge brings up little from that bottom, but that little often of great interest. Thus I have from it a very fine Isis from 517 fathoms, and yesterday on the same bottom but less depth I obtained several specimens of a small crinoid which I have no means to determine, but which I believe to be neither a Pentacrinus nor a young Comatula. I hope to be able to dredge more over that kind of bottom on our passage home.

I have thus dwelt on the results of the last two weeks' work, because I believe them to be more important than what I did during the four preceding months, during which time I have gathered a good deal of information more or less new or useful, but which did not admit of a very connected report. I hope to make use of it in proper time.

At the suggestion of Professor Agassiz we have laid a wire strung with large conch shells from the reef at the Samboes to 10 fathoms, and are going to extend it to 20 fathoms, with the intention of examining it in a year or two and noting the corals which may have grown on the shells, and their increase of size in a given time. I had ordered tiles for the purpose before leaving Washington; but they were never sent, and at Mr. Mitchell's suggestion we took shells. I wish we had a greater variety of materials at our command, on account of what I mentioned before as the capriciousness of corals.

Five hundred and ninety-sixth Meeting.

June 9, 1868. — ADJOURNED ANNUAL MEETING.

The PRESIDENT in the chair.

The Corresponding Secretary read letters relative to exchanges, and a letter from Mr. Theodore Lyman, declining the office of Treasurer to which he was elected at the previous meeting.

Professor Lovering called up the recommendation of the Rumford Committee which had been referred to this meeting, and, in accordance with the recommendation, $1,000 were appropriated from the Rumford Fund for beginning the publication of Count Rumford's works.

Mr. Charles J. Sprague was elected Treasurer.

The Treasurer's report was received from the Auditing Committee and ordered to be entered on the Records.

On the motion of Professor Rogers it was *voted*, "That the thanks of the Academy be presented to Mr. John C. Lee, for the care and fidelity with which he has discharged the duties of Treasurer of the Academy."

The President called the attention of the Academy to the recent decease of Hon. Levi Lincoln and Dr. George R. Noyes of the Resident Fellows.

Nominations for election into the Academy were read.

The Corresponding Secretary read a portion of the following Report of the Council upon the changes which had occurred in the Academy during the past year, and the reading of the remainder was postponed to an adjourned meeting to be held on the fourth Tuesday in June.

During the year just elapsed, death has removed from the ranks of the Academy seventeen members, of whom *four* were Resident Fellows, *six* Associate Fellows, and *seven* Foreign Honorary Members. This loss, great as it is numerically, is even more memorable from the number of distinguished names which it embraces.

Besides the Home and Associate Members whose services to science, letters, and public affairs we shall have occasion to commemorate, our obituary list includes the names of Faraday, Bopp, Brewster, Mittermaier, Boeckh, Lawrence, and Rayer of our foreign academicians, — names which in various degrees have been familiar to the world of science and letters for nearly half a century, and of which more than one has been illustrated by researches of transcendent importance, marking eras in progress and laying the foundations of new sciences.

Of the entire list of members deceased within the year, it is perhaps worthy of note that all except three, Professor Jewett, Dr. Warren, and Francis Peabody, had reached quite an advanced age. Two of the number, Dr. James Jackson and President Day, had attained respectively to ninety and ninety-four years; five, viz. Brewster, Mittermaier, Boeckh, Lawrence, and Dewey, had reached or passed beyond their eightieth anniversary; and the remaining six, Loring, Smyth, Lord, Bopp, and Faraday, had each transcended the limit of three-score and ten years.

Of the home members whose services we desire to commemorate, we may appropriately begin our record with a notice of the venerable associate and friend whose professional skill and wisdom we have so long ranked among our social blessings, and whose gentle benignity wins us even now as if he were still among us.

DR. JAMES JACKSON, for many years an eminent physician and the acknowledged head of the medical profession in Boston, has died during the last year at the advanced age of nearly ninety years. He was born in Newburyport in 1777, and was graduated at Harvard College in 1796. He was one of the chief founders of the Massachusetts General Hospital, and was the first and for a number of years the only physician of this institution. His clinical lectures in the hospital were continued for many years in connection with his other duties in the medical school as Professor of the Theory and Practice of Medicine in Harvard University. He was for seven years President of the Massachusetts Medical Society, and on the decease of Dr. Bowditch he was elected President of the Academy of Arts and Sciences in 1838, which office he accepted with the condition that he should retire from it on the following year.

The intellect of Dr. Jackson was capacious, logical, exact, and unwavering in its loyalty to honesty and truth. His social traits were genial, impulsive, and sanguine. Coming in his early life from the schools of European erudition, he brought with him a deep respect for the labor and learning, the authority and conventional prestige, of the then accepted luminaries of medical science. His methods of practice were in a high degree energetic and decisive. He believed, in common with many others of that day, that most diseases were susceptible of control, if not of removal, by the modes of artificial interference then generally in use. These opinions and habits were greatly modified, if not subdued, in the latter half of his long and observing life, so that although he never lost his professional fondness for the forms and implements of his art, and sometimes carried their use to a scrupulous degree of exactness, yet he became more tolerant of nature, more humble in his expectations from art, and more distrustful of reckless interference, whenever certain harm was to be balanced against doubtful good.

Dr. Jackson continued the active practice of his profession, especially as a consulting physician, and also attended annual meetings of societies to which he had been attached, for some time after he had attained the age of fourscore years. In the few last years of his life, under the joint influence of physical and mental decadence, he retired from public view. Yet he died remembered, honored, and regretted, leaving among his numerous acquaintance an appreciative freshness of memory which time had not been able to change or obscure.

CHARLES GREELY LORING, son of Caleb and Ann (Greely) Loring, was born in Boston on the 2d of May, 1794. His ancestors on his father's side were among the earliest settlers of the colony of Plymouth. Some of the prominent traits of his character indicated his Puritan origin. From his mother, the daughter of a naval hero of the Revolution, he inherited an ardent spirit of patriotism and love of liberty.

His school-days were passed in Boston. Having completed his preparation for college at the Public Latin School, where he received a Franklin medal for industry and good scholarship, he entered the University in advanced standing in the year 1809, and was graduated with high honors in 1812. Immediately after leaving college, he became a member of the Law School at Litchfield, Connecticut, which, under the charge of Judges Reeve and Gould, was then the leading institution for legal instruction in the United States. He finished his preparatory studies for the bar in the office of the Hon. Samuel Hubbard in Boston, and was admitted a member of the Suffolk bar in the autumn of 1815. From that time, for nearly forty years, Mr. Loring continued in the active and successful practice of his profession as a lawyer and advocate, rising to be one of the acknowledged leaders of the bar, until in the year 1854, becoming somewhat weary of the conflicts of the forum and of the constant and pressing cares and labors necessarily attendant on faithful service and devotion to the interests of his clients, which had in some degree impaired a constitution never very robust, he accepted the office of Actuary of the "Massachusetts Hospital Life Insurance Company." He continued in the discharge of the duties of this important trust until his death, which took place at his summer residence in Beverly on the 8th of October, 1867.

By his first wife, Miss Ann Pierce Brace, of Litchfield, to whom he was married in 1818, Mr. Loring had four children, two sons and two daughters, who survive him.

This short and simple narrative comprises all the leading events in the life of our deceased associate, — so true is it, that a faithful and exclusive devotion of time and talent to practice at the bar in this country, while it is pretty sure to win great professional success, is quite consistent with a quiet and uneventful life. It does not necessarily lead, as in England, to wide-spread distinction. A lawyer, who resolutely eschews active participation in politics and refuses to hold official stations, rarely reaches an extended public fame. Nevertheless, the qualities of mind and character which are requisite to forensic skill, and to the attainment of a high position as a lawyer and advocate, are in many respects the same as, and in none inferior to, those which distinguish the successful politician and statesman, although they are exercised and displayed on a more narrow and less public arena. Intellectual capacity, trained and disciplined, so that it may at all times be ready for vigorous and efficient action, legal learning and wide general culture, courage, good temper and knowledge of mankind, are essential characteristics, without which the conflicts of the forum cannot be successfully carried on, or its triumphs surely won. All these qualities Mr. Loring possessed in an eminent degree. Endowed with good natural powers, he had cultivated them by long and assiduous study. His learning in all branches of the profession was affluent. He was especially distinguished for his thorough knowledge of the rules and principles of the commercial code. These he illustrated and applied to new cases with singular force, felicity, and success. The reports of cases argued and adjudged in the Supreme Judicial Court of Massachusetts and in the Circuit Court of the United States, for the first circuit during the thirty years from 1825 to 1855, furnish ample evidence of the fulness and extent of his learning, and of the important part he bore in laying the foundations and giving shape and symmetry to that branch of American jurisprudence which embraces the rights and duties of parties under mercantile and maritime contracts and transactions.

It was not solely as a sound and learned lawyer that Mr. Loring was distinguished at the bar. He was also an eloquent and persuasive advocate. His eloquence and power of persuasion did not consist merely in a strict observance of the rules of rhetoric, or in well-rounded periods, or special beauty of diction. He was master of a higher and more effective order of advocacy. Strictly conscientious, and governed in the performance of his professional duty by a rigid adherence to principle, he did not undertake the conduct of causes in the justice of which he did not fully believe. He always felt that the case of his client was a sacred trust committed to his hands. He espoused it with all the zeal and enthusiasm of his nature. He spoke in its behalf with an earnestness, sincerity, and persuasive force which flowed from conviction. This was the main source of his power as an advocate. His keen sense of justice enabled him to see and expose with cogency and clearness the injustice which others attempted to perpetrate under the forms of law; a hater of oppression, chicanery, and fraud, he never failed to detect them and to hold them up to abhorrence and scorn, with a power of speech which made even those who sought to profit by such base arts ashamed of their own wickedness; with strong and active sympathies, which led him to identify himself with the cause which he pleaded, he was always sure to gain the shortest and surest way to the minds and hearts of those whom he addressed. We speak of Mr. Loring's characteristics as they were developed in the maturity of his powers, after he had attained a foremost rank as a lawyer and advocate among such men as Webster, Mason, and Choate, — great luminaries of the bar of this Commonwealth of a generation that has now passed away. It would, however, convey an erroneous impression, if it was supposed that this professional success was gained without effort. He himself was wont to attribute it to a fixed and constant habit of industry; and certainly it is true that he was an indefatigable worker in the field of trained human labor which he had chosen. But it was not the mere love of work or the desire of success or a wish for fame which prompted this labor. It had its origin and motive in an ever-present, conscientious sense of duty. It was this great and controlling moral quality of his nature which gave fulness and completeness to his character, and secured for him an ascendency over his equals in talent and learning. The "hard uses" of the profession during a period of nearly forty years did not tarnish or impair it. He was always pure, single-hearted, of spotless integrity, and of unwavering fidelity to every trust. He trod no path but that of duty. His character and life afford signal proof that the profession of the law is as consistent with the purest moral culture as it is with the highest intellectual attainments.

It was to the labors of his profession that Mr. Loring gave the larger portion of his active life. He declined to enter into political contests or to accept public office. There was no lack of opportunities if he had desired high station. The office of Justice of the Supreme Judicial Court was offered for his acceptance. Twice he declined an appointment to the Senate of the United States; once on the resignation of Mr. Webster in the year 1849, and again in place of Mr. Everett in 1853. He was sincerely diffident of his capability for efficient public service. He feared lest his long and exclusive devotion to practice at the bar had unfitted him for the varied duties and labors of political life. Once only, after he had retired from the active pursuit of his profession, was he induced by a peculiar public exigency to serve as a member of the Senate of Massachusetts. Those who were cognizant of his eminent usefulness during this brief term of service know how great would have been the gain to the public if he had been willing to give more of his time and talents to similar labors.

But although he elected the walk of private life, and expended the strength of his mature years in the zealous and faithful performance of professional duty, he was not regardless or neglectful of the claims which the community in which he lived had on that portion of his time and talents, which would be spared from the pressing cares and labors of his regular pursuits. To the cause of education, to the institutions of religion, to public charities, to private benevolence, to social culture and intercourse, to the offices of friendship, he never failed to contribute his full share of whatever of duty or service or benefaction it was in his power to render. He served for nearly twenty years, during the busiest portions of his life, as one of the Fellows of Harvard College. For many years he was superintendent of the Sunday-school connected with the religious society to which he belonged, and always prepared himself with scrupulous fidelity to give instruction to a class of pupils under his special care. He never failed to give largely in proportion to his means to every object which seemed worthy of encouragement and support. In the social circle his frank and kindly nature, his quick and warm sympathies, and his charming conversational powers, made him always the welcome guest as well as the genial and generous host. It is not strange that a man in whose character and life so many admirable qualities were blended should have gained a wide and commanding influence in the community in which he lived. If anything had been wanting to make him the one to whom all persons turned with abiding confidence, reverence, and love, it would have been supplied by the noble enthusiasm with which he espoused the cause of the Union and the Constitution in the late civil war. Although then approaching to the allotted age of man, his ardor, energy, and zeal in the cause of his country, showed that patriotism and love of liberty had not abated one jot or tittle of their original vigor and fire within his breast. With true civic courage, in the earlier days of Southern aggression, when resistance to the demands and the power of slavery was not calculated to enlist popular favor, he had stood forth as an earnest opponent of measures designed to abridge the constitutional rights of the North, and to consolidate the power of the national government in support and defence of slavery. By speech and pen he resisted the annexation of Texas, the invasion of Kansas, and the enforcement of the laws for the surrender of fugitive slaves. When the aggressive acts of the South culminated in treason, he did not hesitate to accept the issue. Abhorrent to his kindly nature as were the horrors of a civil war, he felt that they were to be encountered fearlessly rather than to submit to a sacrifice of the rights which constitutional liberty had secured to the people of the whole country. From the breaking out of the war to its close, he was untiring in his efforts, both public and private, to aid the cause of the nation. Especially by his writings in 1862, on the subject of the relations of England and the United States growing out of the civil war; in 1863, on the rights and duties of belligerents and neutrals with special reference to the course pursued by England towards the United States; and in 1865, in his views on reconstruction, — he contributed largely to a correct understanding of the topics on which he treated, and afforded striking proof of his ability to discuss grave questions of international and constitutional law with originality, learning, and vigor.

It was Mr. Loring's supreme satisfaction to live to see the war ended, slavery abolished, peace restored, and the reconstruction of the Union in a fair way of being accomplished. It was also his grateful privilege to obey the call of his *Alma Mater* in the summer of 1865, and to preside over the commemorative festival of her sons in honor of those who had given their lives as a sacrifice for their country, and to welcome back those who had returned after brave and successful service in the field. The grace and dignity and tenderness with which this duty was performed by him will long live in the memory of those whose privilege it was to participate in the interesting services of that occasion.

The universal sorrow occasioned by Mr. Loring's death found expression from the bar, the pulpit, the bench, and the various associations with which he had been connected. "*Multis ille flebilis occidit.*" It rarely happens that the death of a private citizen is regarded as a public loss. Such was the feeling which waited on his obsequies, and no higher tribute could have been paid to his life and character.

Charles Coffin Jewett, the son of Rev. Paul Jewett, was born at Lebanon, Maine, in 1816. He was graduated at Brown University in 1835. Immediately or shortly after taking his degree, he became a member of the Theological Seminary at Andover, and completed the course of study there, yet without entering on the active duties of the clerical profession. While at Andover he commenced his bibliographical labors by preparing a catalogue of the excellent Library of that institution. The rare merit of this work attracted the attention of the few men capable of an intelligent judgment in a department of literature then much less cultivated than now, and led to the appointment which determined his subsequent course of life. In 1842 he was chosen Librarian of Brown University, and held the office for four years, combining with it for most of the time that of Professor of Modern Languages and Literature, to which he brought the preparation, not only of diligent and faithful study, but of prolonged travel and residence on the continent of Europe. He left Providence to accept an appointment as Assistant Librarian of the Smithsonian Institution, of which he very soon was made Chief Librarian. Here he distinguished himself, not only by his enterprise and skill in endeavoring to lay the foundation of a great national library, but equally by his polemic ability in advocating the policy by which he hoped that the Smithsonian fund would be devoted primarily to that end. Professor Jewett resigned this office in 1855, and his services were immediately engaged in the initial measures for the establishment of the Boston Public Library, of which, on the completion of its organization in 1858, he was chosen first Superintendent. For thirteen years he has been soul, heart, brain, and hands of this institution, systematizing and energizing every branch of its administration, inspiring its Board of Direction with his own zeal, and stimulating its benefactors to generous gifts by the assurance that the custody, arrangement, cataloguing and use of the contents of the library, would be provided for with equal wisdom and fidelity. In this charge he labored with an industry too strenuous, and with too little regard to the hygienic laws which should have set limits to his exhausting toils, till the 8th of January last, when he was suddenly stricken with apoplexy while engaged in his duties at the Library, soon became entirely unconscious, and died at his residence in Braintree early the next morning.

Professor Jewett, as a bibliographical scholar, and as a librarian both learned and judicious, has left in this country no superior, few equals. The catalogues prepared under his auspices bear ample witness to his ability and his attainments. Few, indeed, may be able to criticise the details of a work of this class; but there is no man who uses a library, whose revenue from it does not depend to a very great degree on its catalogue. An ill-made catalogue robs a library of half its practical worth and beneficent power. The citizens of Boston can hardly estimate, and cannot by any possibility overestimate, the reasons they have for holding our late associate in reverent and grateful remembrance. When we consider how large a part of what the Public Library is, and of what it accomplishes, is due to him, we might not unaptly plagiarize for him from Sir Christopher Wren's tomb in St. Paul's, and inscribe among those alcoves, "Si quæris monumentum, circumspice."

It is hardly necessary to say that Professor Jewett was an accomplished scholar, conversant with good letters, both classical and modern; had he not been so, he could not have been the bibliographer that he was. At the same time his mental gifts and endowments adorned, and were adorned by, those traits of domestic and social excellence, abounding courtesy, kindness and generosity, and Christian piety, which won for him the love in life, and the regret in death, of all who knew him, and most, of those who knew him best.

JONATHAN MASON WARREN was born in Boston, February 5, 1811, the son of John Collins Warren and Susan Powell Mason, his wife, daughter of the late Hon. Jonathan Mason. His grandfather was Dr. John Warren, the younger brother of Dr. Joseph Warren, whose heroism and martyrdom have made the name illustrious in our history.

At the age of nine he became a member of the Boston Latin School, then under the late Benjamin Apthorp Gould as its instructor. In 1827 he joined the class which had entered Harvard College the preceding year, but was forced to leave college after a few months on account of his health.

Finding himself at length in a condition to return to his labors, he began the study of medicine in the year 1829 under the direction of his father. This was the beginning of a life of hardly interrupted industry. Taking his medical degree in 1832, he sailed for Europe, where he remained for three years diligently pursuing his studies. On his return in 1835 he at once entered upon the practice of his profession, and, his father leaving Boston for Europe in 1859, the whole responsibility of a great professional business was thrown upon him at this early period of his career.

In 1844 he revisited Europe, and again in 1854, partly with reference to his health. But he did not receive the benefit he had hoped from this visit, and was so far from well that by the advice of Dr. James Jackson he tried the experiment of passing a winter in Rome, but without avail, and returned home an invalid, as it seemed at the time, with doubtful prospects of future health. He was at length, however, so far restored as to resume practice, and in 1857 removed to his late father's house in Park Street, devoting himself mainly from this time to Surgery.

His health was much shaken by two successive attacks of dysentery in the summers of 1865 and 1866. The death of his excellent brother, Mr. James Sullivan Warren, in February, 1867, was very depressing to him, and almost from this time his friends dated a perceptible change in his condition. In May it was discovered that a tumor was developing itself in the abdomen. He did not, however, mention the fact, and kept at his work until the first of July, when he went to his summer residence at Nahant. A fortnight later, threatening symptoms appeared, and, after many paroxysms of pain, and gradual decline of all the bodily powers, he died on the 19th of August.

Dr. Mason Warren was the third in the direct line of descent of a family which has now for more than a century been identified with the practice of Surgery and of Medicine in this town and city of Boston. He maintained and extended the reputation which he inherited. For twenty-one years he served as a surgeon at the Massachusetts General Hospital, performing more operations during this long term than any other surgeon had performed in the institution during a similar term of duty. From the first year of his entrance on professional life to the very verge of the mortal illness which had seized him, he was engaged in a most laborious and extensive practice. His skill, his devotion to his patients, his kindness, his courtesy, made him everywhere honored and beloved.

In the midst of his busy days he found time to contribute many papers to the medical journals, and in the last year of his life he gave to the world the results of his large and long experience in an elaborately finished volume of more than six hundred pages, filled with the records of many most interesting, and some extraordinary, cases.

Among the papers that he published the following may be mentioned as of special importance: —

Account of Rhinoplastic Operations performed by himself. *Boston Medical and Surgical Journal*, 1840.

Taliacotian Operation (flap divided seventy-two hours after the operation). — Successful Result. *Boston Medical and Surgical Journal*, 1843.

Account of a new Operation for Closure of Fissure in the Hard Palate. *New England Quarterly Journal of Medicine and Surgery*, 1843.

Operation for Fissures in both Hard and Soft Palate. *American Journal of Medical Science*, 1843.

Successful Ligature of both Carotids for Erectile Tumor of Face. *Ibid.*, 1846.

Lithotrity, with the use of Ether in these Operations. *Ibid.*, 1849.

Fissures of the Soft and Hard Palate. *From Transactions of the American Medical Association*, 1861.

On Neuralgic Affections following Injuries of Nerves. *Ibid.*, 1864.

Recent Progress in Surgery. Annual Address before the Massachusetts Medical Society, 1864.

Surgical Observations, with Cases, 1867.

In 1844, Dr. Warren received the degree of Master of Arts from Harvard University, and in the same year he was elected Fellow of the College of Physicians and Surgeons of New York. He was at a later period honored by being chosen President of the Suffolk District Medical Society, and of the Medical Benevolent Society.

Few men not pressed by urgent need have toiled so assiduously for a long course of years as Dr. Warren did to the last, in spite of all his bodily hindrances. His patients and his friends remember him with affection and gratitude, and the profession which he adorned will long refer to him as the worthy successor of an unchartered inheritance which has outlived many royal dynasties that have been for a while its contemporaries.

Dr. Warren married, in 1839, Anna Caspar Crowninshield, youngest daughter of Hon. Benjamin Williams and Mary (Boardman) Crowninshield, who survives him. He leaves six children, five daughters and a son, John Collins Warren, now studying medicine in Germany.

JEREMIAH DAY, the son of a Congregational minister in New Preston, Litchfield County, Connecticut, was born August 3, 1773. He was graduated at Yale College in 1795, and then took charge of the school in Greenfield, a parish of the same State, which Dr. Dwight had set up, and which he left to succeed Dr. Stiles in the Presidency of Yale College. Next Mr. Day was a tutor in Williams College, then recently founded, and after two years spent in this office accepted a similar one from his own *Alma Mater*. Here, having qualified himself to preach, he exercised his gift in the neighborhood of New Haven, until in 1801 he was attacked with hemorrhage, and was advised to go to Bermuda for his health. Soon after his departure, in the same year, the President and Fellows of Yale College gave him the chair of Mathematics and Natural Philosophy. But he returned from the island wholly unfit to discharge any college duties, and, as he thought, destined to speedy death. He took refuge at his father's house, feeble, melancholy, and apparently sinking, until a treatment of reduction which had been tried upon him was abandoned, and tonics restored him to some degree of health. In the summer of 1803 he entered on the duties of his professorship, not taking a heavy burden at first, but by degrees enabled to assume a due share of labor, and to fill his place in the College with efficiency and success. He was, however, always what may be called a man of feeble health, always obliged to take great precautions against exposure, and to govern himself by the strictest rules both as to diet and amount of exertion.

For the development of the man this trial from bodily weakness and from temporary despondency was attended with the happiest results. By nature given to prudence and moderation, he grew in these respects from his ailments; he had to study his constitution and to exercise self-control; he was obliged to be orderly and methodical; all these habits, thus learned or thus strengthened, helped his intellectual and moral nature, and he attained in this way a degree of practical wisdom which was one of his striking characteristics. The frail body, also, by discipline resisted the causes of decay, so that the man, of whose life at thirty all despaired, lived beyond the age of ninety-four with full vigor of intellect.

From 1803 until 1817 Professor Day filled the chair to which he was first appointed, and on the death of Dr. Dwight, with very great shrinking, accepted the vacant office of President. The two men were in many respects quite opposite. The one was impulsive, rhetorical, brilliant, formed to command; the other calm, philosophical, without brilliancy, unwilling to lead. But the choice, as the event showed, was a wise one. During the twenty-nine years of his presidency the College grew steadily and surely. He had the respect and esteem of all. His success showed, we think, that colleges, which often strive to find brilliant untried men for their principal officers, men unused to college ways and ignorant of that queer thing, a college student, might do better sometimes, if they looked after a noiseless worker, experienced in his calling, honored by those around him, who has proved himself equal to all the emergencies of discipline and of instruction in the past.

At the age of seventy-three, President Day laid down his office, not because he felt any peculiar infirmities of old age creeping over him, but because he wished to resign before infirmities should weaken his judgment and lead him to outstay his time. Followed by the love of all who had known him, — among whom were all the two thousand and five hundred to whom he had given a degree, — he retired into private life, yet he was not wholly unconnected with the College, having been on his resignation chosen into the Board of Fellows. In this corporation he served until just before his death, and thus had had, as an officer and a Fellow, a share in the government of the College for sixty-seven years. His life during his retirement was serene and happy, his mind retained its strength and its interest in the affairs of the world until his last illness, and even in those two or three days before his end, the power of expression, rather than that of thinking, gave way. He closed his eyes in peace on the 22d of August, 1867, when he had reached the age of ninety-four years and nineteen days.

Perhaps the leading trait of President Day's character was the harmony of his whole nature, in which you could scarcely say what was due to native qualities, what to philosophical training, and what to Christian principle. His mind by nature had certain very valuable traits of the more solid and unpretending sort. Imagination was not remarkable among them, nor was he in any marked degree original, nor could he be called a deeper thinker than many men are. But a person familiar with him would be struck with his uncommon clearness and precision in thought and expression, with his great good sense and the perfection of his practical judgment, with the admirable method which he showed in everything. In the composition of his character, the two qualities which were nearest to the border-land of defects were caution and reserve. The latter was quite noticeable. He never spoke of himself, — neither of what he had done nor even of the maladies which had afflicted him during his later life. But his reserve, not being the effect of pride or of timidity, but rather of humility and of the absence of selfish affections, while it rendered men somewhat unfamiliar with him, detracted nothing from his power to inspire respect and veneration. So also his caution was not properly timidity, but the natural foundation of a prudence, which being under the control of principle, always carried the judgment of others with it.

His religious principle blended beautifully with a natively blameless character, so that one could not separate the two. It was not put on, but seemed as much a part of his life as were his intellectual qualities. He never spoke of himself, he showed his religious life by deeds, not by words; but there was an impression conveyed to all who knew him that he was not only a blameless but a holy man, one who " walked with God." And a spirit of sweet peace accompanied him wherever he went, together with a dignity which was the shadow cast by his pure and elevated life, which made no claims and sought no homage, but received it as an involuntary tribute.

As a man of science and of philosophical thought, President Day entered into the two fields of Mathematics and Metaphysics. From the time of his leaving the mathematical chair, upon his election to the presidency, he was almost entirely devoted to the other branch of study and instruction. During his professorship he felt the want of elementary treatises in the mathematical course which should be fitted to the peculiar necessities of American colleges. He accordingly first prepared his Algebra, which was given to the world in 1814, and from that day to this has appeared in a multitude of editions. Many years afterwards he undertook a revision of it with the help of a younger friend, which carried the resolution of the higher equations and some other branches much beyond the limits of the original work. Two years after his Algebra appeared his treatise on Mensuration and Plane Trigonometry, and in 1817 his Navigation and Surveying. These also have been often reprinted, but never had the circulation which was reached at an early day by the Algebra. Of these works, especially of the Algebra, it may be said that, while they are elementary in the strictest sense, and perhaps smooth the road too much for the learner, they have very great merits. They are clear and precise in definition, simple and elegant in explanation, proportionate in their parts; they leave no difficulties behind to embarrass the learner; they make such a selection from a wide subject as his wants seem to require, reserving the higher and abstruser parts of the science for more advanced students. In short, if the American system is a right one, of leading all the members of the younger classes, with different capacities and tastes, along the same track, nothing could be better than a work constructed on the principles which he followed in his mathematical works.

In the Department of Natural Philosophy, which then was assigned in his College to the Professor of Mathematics, he was able to undertake few or no original investigations. Without good instruments, with a very imperfect library at his command, with feeble health, he could do little more than satisfy the claims of the lecture-room and of the instructor's chair.

President Day brought to the study of Metaphysics and Morals a well-trained mathematical mind and sound common sense. In his day, Locke's reign was almost undisturbed, except so far as the Scotch philosophers had modified Locke's system. He claimed that some of Cousin's strictures on Locke proceeded from a misunderstanding of that philosopher. In the doctrine of the will he mainly followed Jonathan Edwards, and he published two treatises in explanation or defence of his views. The " Inquiry respecting the Self-determining Power of the Will or Contingent Volition," first published in 1838, and afterwards in an enlarged edition eleven years later, was suggested by a translation of Cousin's Psychology, of which he had written a review for the Christian Spectator, a journal published in New Haven. As the review was too long to embrace an examination of Cousin's theory of the will, he attempts in this work, which is a kind of supplement to the review, not only to refute Cousin's doctrine, but to set forth also his own opinions on that point of metaphysical speculation.

The other and larger work on the will, published in 1841, is a *résumé* of the work of Edwards, made in a lucid, dispassionate, truth-loving spirit, and not intended to present the views of the author himself, although he takes no pains to conceal that he is a follower of the great New England metaphysician.

We mention only one article more which came from his pen, — his essay published in the Biblical Repository for January, 1843, entitled "Benevolence and Selfishness," in which he discusses the questions of the ultimate motives of a finite being, and the end of God in the creation of the world. This essay, written partly in explanation and correction of the views of Jonathan Edwards in his work on the "End of the Creation," does great honor, as we think, to his metaphysical capacity.

DANIEL LORD was born at Stonington, Connecticut, September 23, 1795.

In his early infancy his father, Dr. Daniel Lord, removed to the city of New York, where he established himself as physician and druggist. The subject of our notice, being an only child, found his chief associates among his father's friends, men of years and experience, and sometimes of rough adventure, — physicians, merchant-traders, and sea-captains, in whose conversation the observant child found ample food for thought and incentives to future action.

At school he acquired an excellent education, embracing the classical languages and French, then almost the only modern language which was recognized as an accomplishment. At the age of fifteen he entered Yale College, at that time under the charge of Dr. Dwight, and was graduated second in his class in 1814. From College he went to the Law School at Litchfield, Connecticut, whence he returned in 1816 to New York, and continued his legal studies in the office of the late Mr. George Griffin, then, and for many years afterwards, one of the most prominent lawyers of the State. He was called to the bar in 1818, and from that time until within a few weeks of his death, his life was exclusively devoted to his professional duties.

Success came slowly. But no discouragement was permitted to check his industrious pursuit of professional learning, and in those early years of patient, though often disheartened, labor he amassed the legal knowledge and secured the intellectual discipline which were the guaranty of his ultimate success.

The habits of thorough research and faithful application thus acquired, united with his vigorous abilities and his commanding moral traits, obtained at length their appropriate reward, and placed him in the front rank of his profession, at a time when the Bar of New York was made illustrious by men whose names will ever be conspicuous in the history of American jurisprudence.

The position thus won by well-directed effort was never lost by inattention or neglect. In his daily contests in the courts he was often defeated, but never unprepared. The singular uprightness of his character, always keeping him from any attempt to mislead either court or jury, gave a weight to his arguments which rendered him at all times an effective advocate and a formidable opponent. No one could accuse him of ever having tried to "make the worse appear the better reason," and he reaped the reward of his sincerity in gaining the entire confidence of those whom he sought to influence by his logic.

His life was a purely professional one. Once only he was a candidate for a seat in the New York Senate, and was defeated. Twice, however, he was invited to a position on the bench, each time by appointment to fill vacancies, — once to that of the Superior Court of the city of New York, and once to the Court of Appeals of the State. On each occasion — from no sordid motives, as all will believe who ever knew him, but from a deep-grounded distrust of the plan of an elective judiciary, then recently adopted in New York, and from a consequent unwillingness to be connected with a system which he thoroughly disapproved of — he declined the appointment.

His reputation, therefore, was simply that of a lawyer. It borrowed nothing from the prestige of official rank or authority. It was bravely fought for, and fairly won, in an arena where learning and skill could alone secure the prize, and diligence and fidelity alone retain it. The fact, therefore, that his name was so widely known, not only among his immediate associates, but throughout the land, is conclusive testimony to his great ability.

It is not in the nature of things that any private professional reputation should long survive in the minds of men, but Mr. Lord's *influence* will long outlive his *reputation.* Coming to the bar at a time when American jurisprudence was just beginning to assume its present independent position, he did much towards establishing many of its doctrines, which, though now admitted as forever fixed, were then uncertain and without authority. In some departments he was an acknowledged leader, particularly in commercial and insurance law, and the mercantile community will long be governed in some of its most important interests by principles and methods for which it is indebted to him.

The uprightness and truth which illustrated Mr. Lord's character as a lawyer and a man were the outgrowths of a true Christian faith adopted in early manhood, and matured and ripened with the reflection of advancing years, — a faith which bore fruit in Christian labors and a Christian example; which gave a hallowed tone to his influence on all around him, and at the last sustained him calmly as his end approached.

> " The man who consecrates his hours
> By vigorous effort, and an honest aim,
> At once he draws the sting of life and death."

FRANCIS PEABODY, late President of the Essex Institute, was born in Salem, December 7, 1801, and died at his residence in that city, October 31, 1867.

He was son of Joseph Peabody, an eminent merchant of Salem during the close of the last and the beginning of the present century. Soon after leaving school he travelled in Russia and Northern Europe, and on his return settled in Salem, where he continued to reside until his decease. In early life he exhibited a taste for Chemistry and the kindred sciences and their application to the useful arts, which was nurtured and developed by the literary and scientific activity of the community in which he lived, as well as by its commercial enterprise and the elevated and permanent character of its society.

When, in the year 1827, the Essex Lodge of Freemasons, of which he was a member, and the Mechanics Charitable Association, each voted to provide courses of literary and scientific lectures, Mr. Peabody entered zealously into their plans, and delivered before both of these institutions a number of lectures on the Steam-Engine, Electricity, Galvanism, Heat, and other scientific subjects. Three years later he took a leading part in the organization of the Salem Lyceum, was one of its first managers, and one of the earliest of its lecturers. For his zeal in promoting the efforts of his townsmen in this new direction he is to be ranked among the prominent founders of that system of *popular* or *lyceum lectures*, which has since become so universal in this country, and which has grown to be an influential, if not a permanent, feature of our social economy.

His taste for applied science early led him to engage in chemical and other manufactures, in which and commercial pursuits he continued to be interested until his decease.

Mr. Peabody was the first President of the Board of Trustees of the fund given by Mr. George Peabody, of London, for the promotion of science and useful knowledge in the county of Essex, which has recently been incorporated under the title of the "Trustees of the Peabody Academy of Science." He was also one of the original trustees of the Cambridge Museum of Archæology, founded by the same munificent hand, and was a member of several other scientific institutions.

Mr. Peabody was a man of active and vigorous mind, reaching out for knowledge on every side. With a genius for scientific experiments and for mechanical invention he combined a disposition, as well as ample means, to befriend the labors of others in these directions. While distinguished for the variety of his knowledge, he was indefatigable in reducing it to practical use, and was ever ready to apply his liberal means to advance the welfare of his neighbors by the encouragement of industry and the discovery of new sources of profit.

As his life was characterized by devotion to the studies and pursuits which lead to the enduring prosperity of a country, so his memory will long be cherished for his engaging virtues as well as for his active zeal in all worthy undertakings.

PROFESSOR CHESTER DEWEY, D. D., LL. D., who was elected into this society fifty years ago, died at Rochester, New York, on the 15th of December last. He was born at Sheffield, Massachusetts, on the 25th of October, 1784, and had therefore entered upon the eighty-fourth year of his age. He was graduated at Williams College in 1806, was licensed to preach in 1808, but was that same year recalled to his *Alma Mater* as tutor, and in 1810 was appointed Professor of Mathematics and Natural Philosophy (including Chemistry), which chair he occupied for seventeen years, to the great advantage of the College. Here, and afterwards as Preceptor of the Gymnasium, a high school for boys which he established at Pittsfield, and carried on for ten years, he did excellent service and acquired abiding fame as an educator. In 1836 he was called to the charge of a similar, but larger, establishment at Rochester, New York, which he conducted with great success until the year 1850, when he became Professor of Chemistry and Natural Philosophy in the newly founded University in that city. He actively performed the duties of this chair for ten years or more, when his age gave a just claim for retirement, although his powers were little impaired, and he gave occasional lectures or other services until he had reached the age of fourscore. His scientific contributions, which began in the first volume of Silliman's Journal in 1818, were continued down to within a year of his death, extending therefore through nearly half a century. These related, some of them to Physics and Chemistry, more to Meteorology, to which he paid much attention, but most of all to the one department of Botany, with which he has inseparably connected his name. His only separate botanical work was a Report on the Herbaceous Flowering Plants of Massachusetts, made by him as one of the Commissioners on the Zoölogical and Botanical Survey of the State, recommended by Governor Everett, at the suggestion of the Boston Society of Natural History, as the complement of the Geological Survey by the late Professor Hitchcock. Although much less important than the well-known reports of his colleagues, Harris, Gould, Storer, and Emerson, it shows his predilection for botanical pursuits. But, aware that other duties must mainly fill his working hours, Professor Dewey wisely selected a special department upon which he could concentrate the endeavors his leisure might allow, and turn them to permanent account. He chose the large and difficult genus *Carex* for special study, and in it became a leading authority. His " Caricography " in Silliman's Journal began in the year 1824, and finished with a general index to the numerous articles scattered through forty-three years, in January, 1867. There are very few of our about two hundred North American species with which Dr. Dewey's name is not in some way associated, and of many he was the original describer.

Professor Dewey must have been one of the latest survivors of those whose taste for natural history was developed under the lectures of Amos Eaton, when that remarkable man commenced his career as a teacher in Western New England, and in Botany, having devoted himself perseveringly to a particular department, he became the most distinguished of that school. As teacher, man of science, citizen, and Christian minister, he was a specimen of the typical Western New-Englander, — a peer among those who have not only made that district what it is, but have also in great measure founded the institutions and determined the character of the now lengthened line of States westward from the Hudson to beyond the Mississippi. Highly esteemed and honored throughout an unusually long and useful life, in his serene old age he was very greatly revered.

DR. SAMUEL LUTHER DANA died at Lowell, Massachusetts, March 11, 1868, in the seventy-third year of his age, of the effects of a fall on the ice some weeks before.

Dr. Dana was a native of Amherst, New Hampshire, fitted for college at Phillips Academy, Exeter, and entered Harvard University at the age of fourteen. Immediately after graduation he entered the army, and continued in active service as lieutenant of artillery till the close of the war of 1812. He then studied medicine, and in 1818 received the degree of M. D. from Harvard University. After practising as a physician, first at Gloucester, Massachusetts, and afterwards at Waltham, he was led by his special fondness for chemistry to give up his practice in order to engage in the manufacture of oil of vitriol and other chemicals. Having continued to superintend the works of the Newton Chemical Company for many years, he was in 1833 induced to accept the position of Chemist of the Merrimack Print Works in Lowell, a position which he held for the rest of his life.

With a breadth of view deserving of all praise, the founders of the Merrimack Manufacturing Company saw the importance of bringing science to the aid of art, and, from the outset, considered a regular chemist as indispensable in their print-works. When the first vacancy occurred, they were particularly fortunate in securing the services of Dr. Dana. Having an ardent love for science, rare aptness in tracing out causes, and untiring perseverance in applying principles to practice, he thenceforth devoted himself most industriously to matters connected with calico-printing. The first requisite for a good print is the thorough bleaching of the cloth. Dr. Dana made a full study of this subject, and succeeded in diminishing the number of operations which had before been deemed essential. His ideas were made known to the world by a communication sent to the Société Industrielle de Mulhouse, and published, in part, in their Bulletin in 1836. His plan at first met with some opposition, but is now very generally used, and is commonly known as the " American method " of bleaching.

One of his earliest investigations related to the action of cow-dung in clearing calico of the thickening used in printing on the mordant; and he was thus naturally led to inquire into the nature of manures in general, and of the products of decay, then little understood, but afterwards more fully investigated by Malden and others, and distinguished as gein, humin, and ulmin. The collateral knowledge thus acquired was freely communicated to various friends, and awakened so great an interest that he was urgently requested by some of his appreciative fellow-citizens to deliver a course of lectures on the Chemistry of Agriculture. The request was complied with in the winter of 1839-40. The publication of these lectures being solicited as likely to prove of great advantage to the agricultural interests of the Commonwealth, Dr. Dana condensed his notes into a pithy treatise, which was issued in 1842 under the quaint title of "A Muck Manual for Farmers," — a name indicative of the prominent idea of the work. Five editions of this book have been published in this country, and it has been reprinted in England. At the suggestion of Dr. Warren, he also wrote an Essay on Manures, for which a prize was awarded by the Massachusetts Society for promoting Agriculture. These labors awakened in his own mind such an interest in the tillage of the soil, that he bought a farm near Lowell for the purpose of testing his particular views, and successfully directed its cultivation for many years. He seems to have found no occasion to modify the propositions which he laid down at first; though he might have seen fit to add some limitations to one or two of them, had he tried the unctuous bottom lands of the Mississippi Valley as well as the light soils of Middlesex County.

In point of time, originality, and ability, Dr. Dana stood first among scientific writers on Agriculture in this country, and his works have done great good. But the agricultural treatises by which he has become so well and favorably known were but the secondary results of his inquiry into the nature of cow-dung as related to calico-printing. The primary object was pursued with signal success. He found that the property of fixing mordants was owing, in a great measure, to the presence of phosphates, and that the cumbrous and costly animal excrement might be effectually replaced by cheap soluble phosphates prepared from bones. As the discovery came to be rendered fully available in the regular routine of work, the fifty cows which had been constantly kept by the Merrimac Company were sold off, and a few barrels of burnt bones were occasionally brought into the Works under a name understood only by the initiated. Dr. Dana as an employee of the Company was not allowed to secure a patent for the invention, and thus received no personal benefit from it, though it has effected an immense saving to others. But another person, with a full knowledge of what had been done at the Merrimac Print Works, went to England and sought to turn the discovery to account there; and it was then found that Mercer had at the same time been making similar trials. In fact the English and the American chemist independently originated the use of dung substitutes. But probably to Mercer must be conceded the priority of experiments by a few months, while Dana was the first to make the substitution a complete success in actual practice. Neither gained full credit for the discovery, because in neither case was the matter made public till Mercer, finding himself not to be in exclusive possession of the idea, joined with others and patented the use of phosphates and arseniates for dunging.

In 1840, Dr. Dana, at the request of the city government of Lowell, made a careful examination of the various well-waters of the city, with reference to their action on lead pipes. And his interest in this important sanitary matter did not end with the presentation of his well-digested report; but for the sake of making generally known the insidious danger then so little understood by physicians themselves, he supervised the translation and publication of Tanquerel on Lead Diseases, with valuable annotations, — the work of translation being done chiefly by his daughters.

In 1851 the manufacture of rosin-oil was brought to his notice, and he contributed much to the improvement of that branch of industry.

In 1860, Dr. Dana gave his library, containing many rare and valuable chemical books, to Harvard and Amherst Colleges.

From the excellence of what he published, we might have expected a valuable work on general agricultural chemistry, had he been able to fulfil the partial promise made at the close of his prize Essay on Manures. But in later years his time was occupied by the daily duties of his position and the management of his farm, his health not always allowing him to labor as actively in scientific matters as his ever-lively interest would prompt. Dr. Dana was so quiet as well as accurate and thorough in his work, and so concise in the expression of his thoughts, that he could be fully appreciated by few. But his earnest devotion to truth, the precision and extent of his knowledge, his high sense of honor, and his conspicuous integrity of character, commanded the fullest respect and confidence of all who knew him.

PROFESSOR WILLIAM SMYTH was born in Pittston, Maine, February 2, 1797, but in his childhood his parents removed to Wiscasset, which was his home till he entered college. The story of his early struggles to obtain a liberal education, of his indomitable perseverance, his self-sacrificing, independent spirit, and the success and reputation of his subsequent life, furnishes most valuable lessons for the young. His preparatory course for college he pursued alone, without regular instruction, at intervals of work as a teacher; the last two years at Gorham, Maine, where he was an assistant in the Academy with Rev. Reuben Nason (Harv. 1802), an accomplished classical and mathematical teacher, whose counsel and aid he always gratefully acknowledged. He entered Junior at Bowdoin, September, 1820; and, though from late hours of preceding years over Greek and Latin he was compelled to study by another's eyes (his lessons being read to him by his chum), he graduated, 1822, with the first honors of an able class. In 1823 he received appointment as Proctor and Instructor in Greek at his own College, and, soon after, as Tutor in Mathematics and Natural Philosophy.

Thus called to a new department of instruction, he detected in himself and revealed to others the peculiar talent — it may be said, original power — which has given him so much of a name, and reflected so much reputation on his *Alma Mater*. The predilection of the student had been decidedly for Greek. His success, however, rarely equalled, as a teacher of Algebra, excited quite an enthusiasm in his classes, and thus was designated the eminently fit person to relieve Professor Cleaveland, who had held that department from the opening of the College, and had added Chemistry and Mineralogy to the list of his multifarious duties. In 1825 he became Adjunct Professor of Mathematics and Natural Philosophy, and in 1828 full Professor.

With the deep enthusiasm of his nature he at once gave himself to the study of the French systems; read the *Mécanique Celeste*, and soon began the work of preparing text-books for his classes. In 1830 he published an Algebra, which was among the first in this country in which the French method was employed. This passed through several editions and then gave place to two separate works, the Elementary and the Larger Algebra. There followed, in rapid succession, Treatises on Plane Trigonometry and its Applications, on Analytical Geometry, and the Calculus, of this last a second edition appearing in 1859.

A man of quick sensibility to questions of right and wrong, of deep religious principle, and of ardent and indefatigable nature, he could not be indifferent to any worthy object of philanthropy or of public interest. His enthusiasm was fired by the struggles of the Poles for national life, and then by the Hungarian Revolution. He studied the strategy, was familiar with every phase, political or military, of those movements, and with the qualities of the leaders. As an earnest Christian man, he could not but feel a lively concern in the case of the Cherokees in our country, as a great question involving national justice and honor. He early took decided position in the slavery discussion, and, besides writing in the public press, prepared some of the ablest papers which the antislavery cause called forth. The common schools of Maine are more indebted to him than any other man for his agency in favor of the "graded system." He was active, influential, self-denying in behalf of the church and congregation with which he was associated. His decided mechanical skill was freely bestowed in superintending the erection of the new church edifice near the College and in the principal brick school-house of the village. His last work of this sort was the preparation for the Memorial Hall to commemorate distinguished alumni and friends of the College, especially those who served with honor in the war of the Rebellion. All his energy and skill he threw into this which he was wont to regard as his last work. He was consulting with a contractor on the grounds, when he was seized with the fatal symptoms which, after a little more than two hours of suffering, terminated in death.

Since our last annual meeting, Physical Science has lost, by death, the distinguished services of three of its devotees, — Faraday, Brewster, and Foucault. Of the last two, one was the veteran associate of the French Academy of Sciences, the other the youngest member of his section, already great, however, in achievement as well as in promise; and both of them in the fulness of their strength and usefulness.

MICHAEL FARADAY was born September 20, 1791; the son of a blacksmith in Newington Butts, Surrey, England. He died in the apartments in Hampton Court Palace, which the Queen had assigned to him, on August 25, 1867: and with him went out the brightest light which had radiated through the chemical and physical sciences for forty years.

In 1804, at the age of thirteen, and with a scanty education, Faraday was sent to a bookbinder, with whom he served an apprenticeship of eight years. But he was not toiling these many years merely upon the *outside* of books. He felt through his whole life his indebtedness to the works of Mrs. Marcet, and he says: "Whenever I presented her with a copy of my memoirs, I took care to add that I sent them to her as a testimony of my gratitude to my first instructress." A copy of the *Encyclopædia Britannica*, sent to be bound, riveted Faraday's attention; particularly the article on Electricity. Out of an old bottle he constructed his first electrical machine, and out of a medicine-phial a Leyden Jar, and, thus equipped, he began to experiment. It is to be observed, however, that a great many other boys have done the same thing without growing up to be Faradays. But with them it was play, with him it was work. Faraday himself, in later years, attached considerable importance to the habit which he acquired in early life of repeating, as far as he was able, the experiments of which he read in Chemistry and Electricity. And when, afterwards, the brilliant lecturer enchanted both young and old, he treated his audiences as he had treated himself. He did not suppose them to know, or require them to believe, in any physical law, however familiar, unless he had shown it to them; not even that a stone would drop to the earth, without dropping it first before their eyes on to the floor of the lecture-room.

In 1812, Faraday was invited to the Royal Institution, to hear Sir Humphry Davy lecture. He took notes at these lectures, which he afterwards sent to Davy, asking at the same time his assistance to escape from trade and dedicate himself to science. Davy, who was then at the zenith of his transcendent popularity, had the time and the disposition to encourage the youthful aspirant, and in March, 1813, Faraday became chemical assistant in the laboratory of the Royal Institution. Mr. Gilbert Davies, who had himself detected the genius of Davy in the obscure home of a Cornish carver at Penzance, has said of the illustrious Davy, that the greatest of all his discoveries was the discovery of Faraday. In a few months after Faraday's installation at the Royal Institution, Davy started upon his prolonged visit to the Continent, and Faraday accompanied him as secretary and chemical assistant. His own modest merits were not altogether overshadowed by the shining fame of his companion, and he formed friendships in Paris, Geneva, and Italy which were only broken by death.

Faraday began his career of original investigation in 1816, with a successful analysis of a specimen of caustic lime from Tuscany. Since that time, his contributions to science flowed on in a steady stream, so broad and so deep that every province in Chemistry and Physics has felt the reviving influence. In Acoustics, we recall his researches on the sand-figures and lycopodium-heaps of vibrating plates, on musical flames and Trevelyan's experiment with a heated metal; in Optics, we are reminded of his papers on aerial perspective, on ocular deceptions produced by rotating wheels, on the relation of gold and other metals to light, on the borosilicate of lead or heavy glass, and of his services on the committee to which he was appointed in 1824, with Herschel and Dolland, by the Royal Society, to suggest improvements in the manufacture of glass for telescopes, and his valuable report upon the methods of manufacturing glass; in general and molecular Physics, we remember his labors and discoveries on the limit to evaporation, on the temperature of vapors, and their solidification, on their passage through capillary tubes, on the pneumatic paradox of Clement Desormes, on vegetation; in Practical Science, we are indebted to him for suggestions, experiments, inventions, or discoveries on ventilation, illumination, fumigation, gunnery, on india-rubber and the alloys of steel, on the prevention of explosions in collieries, on the extinguishment of blazing houses, on sustaining a prolonged breath in a dangerous atmosphere, and on the false pretensions of spirit-rappings and table-turnings.

This meagre enumeration, in which years of intellectual activity are registered in as many lines, indicates the exceeding great versatility of Faraday's genius. Nevertheless, Chemistry and Electricity were his favorite if not his absorbing pursuits, from the beginning to the end of the half-century which his discoveries have made so brilliant. And of these two Chemistry served him, but Electricity commanded him. It is impossible in this place to specify, much less to analyze, the varied researches of Faraday in chemistry and electricity.

In 1820 he described two new compounds of chlorine and carbon. "The discovery of these two compounds," says our Foreign Associate, De la Rive, "filled up an important gap in the history of chemistry." In 1825, Faraday discovered benzole, to which, says Hoffman, "we virtually owe our supply of aniline, with all its magnificent progeny of colors."

In 1820, Oersted set up one of those milestones which stand forever in the history of science, by his inauguration of electro-magnetism. Many pressed into the ranks to pursue the new discovery to its consequences, and Faraday among the foremost. He adapted the reaction between the current of electricity in the conductor and the magnet to the production of a continuous revolution, — a stupendous novelty then, without a parallel in mechanics nearer than the heavenly bodies. Even Ampere's sweeping generalization of the electro-dynamic action had not anticipated such a result, although it was afterwards able to explain it.

In 1831 the scientific interest which had been monopolized by electro-magnetism was transferred to a younger sister, magneto-electricity. Magneto-electricity was a corollary from Faraday's new discovery of voltaic induction, when the latter was viewed in the light of

Ampere's theory of magnetism. Science had been in possession of voltaic electricity for forty years, its most powerful instruments had been wielded by Davy, Hare, and Silliman, statical induction was a familiar fact; but it was reserved for Faraday first to see with his own eyes the external influence of current electricity. Henry's induced currents of the higher orders; Page's devices for exalting the intensity of induced currents, and their application to therapeutics; Ruhmkorff's coil, and its various adaptations to blasting, lighting, &c., — all these had their origin in Faraday's discovery of voltaic induction.

On the 20th of November, 1845, Faraday read to the Royal Society of London his startling discovery of the "Magnetization of Light and the Illumination of Magnetic Lines of Force." This discovery, from its delicacy and novelty, deserves to take rank as Faraday's greatest, standing, as Tyndall describes it, among his other discoveries and overtopping them all like the "Weisshorn among mountains, high, beautiful, and alone."

It really means, however, less than the language in which it was announced would convey to most minds. More than thirty years before, Seebeck and Brewster had succeeded in imparting to common glass, by pressure or heat, the depolarizing structure of crystals. It was reserved for Faraday to imitate, partially, the quartz-like structure of oil of turpentine, and its strange power of circular polarization, by subjecting his heavy glass, and even water, to the influence of strong magnets. This discovery was followed by others, in rapid succession, extending over a period of five years; all of which are included in his comprehensive classification of substances into Magnetics and Diamagnetics. A compass needle made out of a diamagnetic would point east and west, where an ordinary compass needle would point north and south. As oxygen is powerfully magnetic, Faraday labored hard to show that it was superfluous to seek for the cause of terrestrial magnetism, or at least of its fluctuations, outside of the earth's atmosphere. The antagonistic properties of magnetism and diamagnetism are influenced by crystallization. Faraday proved this for bismuth, antimony, and arsenic, as Plücker did for the optical axes of crystals. Faraday could have had little expectation in 1825, when he was melting the borosilicate of lead, that this heavy glass, which proved a failure for optical purposes, on account of its deep color, would, after standing on the shelf for thirty years, become the instrument of his grandest discovery.

Nor should we forget how much Faraday did to establish the identity of electricity, from whatever source it is derived, to prove the definiteness of its action, to unveil the process of electrolysis, to bring under one general law conduction and insulation, to assert the dependence of electrical and magnetic induction on the molecular agency of intervening media, and to deal a vigorous and mortal blow to the contact-theory of galvanism. Faraday was not destined, either by early associations, education, or mental constitution, to discuss successfully high themes of speculative philosophy or mathematical science, such as the nature and conservation of force, or the essence of matter, though he has written a few papers upon these subjects. Nevertheless, he contributed more largely, perhaps, than any of his contemporaries to that vast scientific capital, from which Grove has freely borrowed in the establishment of his theory of the Correlation of the Physical Forces, and the convertibility of one manifestation of force into another, as so many varieties of motion.

In 1854, as Faraday was approaching the close of his long period of active service, he delivered a lecture at the Royal Institution, under extraordinary circumstances, on Mental Education. This lecture deserves special commemoration, inasmuch as Faraday regarded the views expressed in it both as cause and consequence of his own experimental life. We here see that faith, humility, patience, labor of thought, mental discipline, well-educated senses, had all conspired to make him a fit high-priest of science. But he says that " this education has, for its first and its last step, humility."

After Faraday returned from his tour with Davy upon the Continent, he pursued the even tenor of his way at the laboratory of the Royal Institution with little interruption; not allowing himself to be distracted from the chosen work of his life by pleasure or profit or applause. Though by following out his researches to their practical application he might have amassed a large fortune, Faraday rejected the glittering bribe when it was already within his grasp, saying: " I felt I was not sent into the world for this purpose." If Faraday was sent into the world for the discovery of truth, then most certainly he accomplished his destiny. For was he not what Tyndall calls him, " the greatest experimental philosopher the world has ever seen "? Though Faraday would not desert his high vocation for emolument, he often did it at the call of his government, of humanity, of civilization, of science. Nothing could have been more distasteful to him than to leave, even for one hour, his quiet walk with Nature, which never cheated however she might elude him, and sit with table-movers and other pretended interpreters of her secrets. After describing the apparatus, which, with great experimental tact, he had devised for exposing the trickery or self-deception of his associates, he writes: "I am a little ashamed of it, for I think, in the present age, and in this part of the world, it ought not to have been required. Nevertheless, I hope it may be useful." And again he says: "I think the system of education that could leave the mental condition of the public body in the state in which this subject has found it must have been greatly deficient in some very important principle."

Many scientific men in Great Britain have surpassed Faraday in the clearness, elegance, and eloquence of their writings. But no one, unless it were Davy, possessed to such a degree Faraday's gift of imparting to others, in the lecture-room, what he had discovered for himself. If, as De la Rive said of him, he was never caught in a mistake in his laboratory, "the hand marvellously seconding the resolves of the brain," we may add that he seldom disheartened his audience by the miscarriage of an experiment, destroying the spell by which he had hitherto bound them. Though he was less dramatic, we might almost say less theatrical, in his style of address than Davy, he never failed to attract an admiring crowd, not only of the thoughtful and the educated, but of the gay and the high-born. He was equally at home with the juvenile audiences which listened to him during the Christmas holidays.

For fifty years, Davy and Faraday together have sustained the glory of the Royal Institution as with the brightness of a whole Academy; both of them of unchallenged greatness, not only as discoverers of physical truths, but as expositors also. In Davy was found a rare combination of poetry and science. Coleridge, it was said, frequented his lectures "to increase his stock of metaphors." Davy preferred the blazing battery of the Royal Institution to the chemist's balance. His generalizations were bold and dazzling. Quality, and not quantity, excited his mind. In ten years he stood on the pinnacle of fame. He was knighted; he was courted; and then his position at the Royal Institution was almost honorary. Faraday relied less on his imagination and more on his experiments. Brilliant as were his triumphs, they were won by hard work. His whole scientific life was one protracted campaign, — and that was a war of posts, and not a succession of brilliant charges. He prized the recognition of academies and universities, but not the insignia of rank. Without leisure for fashionable society, he enjoyed preaching to the humble sect of Christians to which he belonged as much as lecturing before princes and nobles, either of birth or of intellect, at the Royal Institution.

It is little to say of such a man that he was made a Fellow of the Royal Society of London in 1824, a Corresponding Member of the French Academy of Sciences in 1823, a Foreign Associate of this Academy in 1844; that his name was eagerly sought to adorn the list of honor of all other Academies in Europe and America; that he received from the Royal Society of London the Rumford, Copley, and Royal medals; that his simple life was made independent by a pension of £300, conferred upon him in 1835; that Napoleon the exile was instructed by his lectures, and Napoleon the Emperor acknowledged the obligation by naming him Commander of the Legion of Honor.

It is much to say of him that he declined all honors and rewards which were foreign to his scientific character; that, when he might have amassed a fortune of £150,000 by applying old discoveries to commercial uses, he preferred to concentrate his whole mind on the discovery of new truth, dying poor, and leaving a widow dependent on a small pension, which, in noble imitation of his example, she refused to have increased; that he ruled a strong nature so as to be always gentle, and only impatient of those who unnecessarily wasted his time; that he was as much exalted above others in modesty as in intellectual greatness; that he made science honorable and attractive; that he ruled with an imperial sway the hearts no less than the intellects of his generation, and that his final departure from the laboratory in the Royal Institution of Great Britain on the 20th of June, 1862, was followed by one universal pang of grief throughout the world of science.

Long and loudly and perseveringly had Faraday knocked at the secret gates of nature, and most encouraging were the responses which, from time to time, he had received. Nevertheless, he finds it in his heart to say: "I have never seen anything incompatible between those things of man which can be known by the spirit of man which is within him and those higher things concerning his future which he cannot know by that spirit."

Faraday, with a wise precaution, which consulted the convenience of others no less than his own reputation, made a timely collection of his scattered publications, and placed them in a compact and permanent form, suited to the private library of the student of science. His "Series of Experimental Researches upon Electricity" amounted to thirty; all but one of which are now contained in three volumes, published successively in 1839, 1844, and 1855. These Researches are illustrated by other papers upon the same subject, originally printed in the Philosophical Magazine, or in the Journal and Proceedings of the Royal Institution, as the Researches themselves were in the Philosophical Transactions. Faraday's "Experimental Researches in Chemistry and Physics" fill a fourth volume which appeared in 1859. Also, under his sanction and partly from his notes, have been printed, "Six Lectures on the Non-metallic Elements," in 1852; "Six Lectures on the various Forces of Matter," in 1860; and "Six Lectures on the History of a Candle," in 1861.

The first edition of the "Chemical Manipulation" bears the date of 1827. This was followed by an American edition in 1831, and a second English edition in 1842.

SIR DAVID BREWSTER was born, December 11, 1781, at Jedburgh, Scotland, also the birthplace of the accomplished commentator upon Laplace's *Mécanique Céleste,* Mary Somerville. He died at Allerly House, Melrose, in Scotland, February 10, 1868. Although he had reached his eighty-seventh year, we are assured, in the circular announcing his death, that "his faculties were unimpaired to the very last, and he died in the full assurance of faith in Christ Jesus."

What revolutions in old sciences, what brilliant careers of new sciences, are condensed into this single lifetime? Born before Galvanism was even a name, he lived to see Voltaic Electricity give birth to the twin sciences of Electro-Magnetism and Magneto-Electricity, throw off its own ephemeral character in the sustaining batteries of Grove and Bunsen, and close a long catalogue of practical triumphs in chemistry, physics, and mechanics with the oceanic telegraph. Born before Chladni had revived experimental acoustics or published *Die Akustik,* he lived to see this beautiful branch of Physics expand under the cultivation of Savart, Cagniard-de-la-Tour, Wheatstone, Faraday, Lissejous, and Helmholtz, until, by affiliations more startling than any which Mrs. Somerville celebrates in her "Connection of the Physical Sciences," the eye threatens to supplant the ear in the investigation of the laws of sound, quality appears to be resolved into quantity, the vowel sounds are mocked by an orchestra of tuning-forks, and

Brewster's own prediction has the promise of fulfilment, — "I have no doubt that, before another century is completed, a talking and a singing machine will be numbered among the conquests of science." Born at a time when the corpuscular theory of light compelled assent, from the influence of Newton's great name, when Laplace would not tolerate any discussion of the opposing theory in the French Academy of Science, when Lord Brougham fiercely attacked what he afterwards cordially espoused, he lived to witness the complete triumph of the undulatory theory in the hands of Young and Fresnel, and to see what Lloyd has called "a mob of hypotheses" exchanged for what Herschel characterizes as "one succession of felicities." Though neither himself nor Biot ever deserted the lost cause, of which they were the bold experimental champions, Brewster, in his Report on Optics, prepared for the British Association for the Advancement of Science, has done ample justice to the labors of Malus and others who contributed to its overthrow; and he congratulates mankind that "even amid the convulsions and atrocities of that awful period Science shot forth some of her brightest radiations, and, in the moral and religious darkness which prevailed, her evening star was the only surviving emblem of heaven."

Of nearly one hundred papers which Brewster published in scientific journals or in the transactions of academies, there are very few which do not touch his favorite subject, viz., Optics. Optical instruments; polarization, rectilinear, circular, and elliptical; depolarization; the optical character of crystals, and the mode of producing crystalline structure artificially; vision, both subjective and objective; the action of the eye in man and other animals; the interference, dispersion, and absorption of light; the spectral lines in sunlight, as produced by the sun's atmosphere, or the earth's atmosphere, and as multiplied by other absorbing media; — this was the burden of his long life of research and of his voluminous writings.

Born seven years after Biot, Brewster died about seven years later, so that the long and laborious lives of these two eminent physicists went hand in hand for more than half a century. If Brewster did not share the great mathematical powers of Biot, if he was without the genius for vast and rapid generalization displayed by Fresnel in optics and by Ampere in electro-magnetism, nevertheless he was endowed with consummate skill in experiment, and deduced empirical laws where Malus and Arago had failed. We may adopt the language of Professor J. D. Forbes, and say: "His scientific glory is different in kind from that of Young and Fresnel; but the discoverer of the law of polarization, of biaxial crystals, of optical mineralogy, and of double refraction by compression, will always occupy a foremost rank in the intellectual history of the age." His theory of only three primary colors, which he proposed as a substitute for the seven primary colors of Newton, though plausible and well sustained by his experiments, has suffered more from neglect than from criticism, Helmholtz alone having seriously undertaken to refute it. Outside of the range of Optics, Brewster's most important contribution to science was a paper, published in 1821, on the mean temperature of the globe and the close coincidence between the poles of maximum cold and maximum magnetic dip. His first appearance, in 1806, before the commonwealth of science, was with a criticism upon the demonstrations of the lever, as furnished by Galileo, Huyghens, De la Hire, Newton, Maclaurin, Landen, and Hamilton. The solution which he himself gives of this fundamental problem in statics, if not unexceptionable, is certainly ingenious, and indicates a mind well adapted for mechanical research.

Brewster's scientific labors sometimes assumed a practical turn. In 1831 he published, in the Transactions of the Royal Society of Edinburgh, a memoir on the construction of Polyzonal Lenses for Lighthouses. As early as 1748, Buffon had proposed a similar device for burning-glasses. The execution of it was postponed for thirty years, and then proved a failure even in the hands of Rochon. Condorcet, in his eulogy upon Buffon, pronounced in 1788, suggested a modification of his plan, which consisted in building the lens up of separate rings. We next hear of the subject from Brewster in 1811. But the British government were not ready to take the hint from their scientific advisers until after Fresnel had presented to the French Academy of Sciences, in 1822, his memoir on Lighthouses, and his lamp and lens shot forth a blaze of light from the headlands of France.

The Kaleidoscope, which Brewster invented in 1817, delighted and instructed all Europe at the time. Fashion may have dethroned it, though once the ornament of the fair sex: but it has not outgrown its popularity in the nursery, and time never can exhaust the fertility of this invention in devising patterns for the manufactory. No less wonderful, no less charming, is the Stereoscope, which, though invented by Wheatstone, has been remodelled by Brewster in a way which has brought it into the homes of millions, to delight, refine, and civilize all ages and all classes.

The literary labors of Brewster lose their importance, only in comparison with his scientific discoveries. In 1807, Brewster became editor of the "Edinburgh Encyclopædia," which he dedicated to his college friend, Lord Brougham. To write what he did for it himself, and marshal into order the other one hundred and fifty contributors to its eighteen volumes, was his principal occupation for twenty years of his life. Between the years 1819 and 1824 he edited, with Professor Jameson, ten volumes of the "Edinburgh Philosophical Journal"; between the years 1824 and 1829 he edited, single-handed, ten volumes of the "Edinburgh Journal of Science." From 1832 to the time of his death he was one of the editors of the "London and Edinburgh Philosophical Magazine and Journal of Science." In 1811 he edited a new edition of Ferguson's Astronomy, and in 1837 he published a Treatise on Magnetism, which he had written for the seventh edition of the Encyclopædia Britannica. Add to these labors his little work on the Stereoscope, and the two editions of another little work on the Kaleidoscope, his Treatise on New Philosophical Instruments, a Treatise on the Microscope, a volume on Optics which was published in Lardner's Cyclopædia, his Letters on Natural Magic, his Martyrs of Science, his Essay on the Plurality of Worlds, his Life of Sir Isaac Newton, published in the Family Library, to say nothing of his numerous contributions to the Edinburgh Quarterly and North British Reviews, and the wonder is that he found any leisure for his scientific pursuits.

The reflections cast upon Newton by the astronomer Baily, in his Life of Flamsteed, reanimated the spirit of Brewster, never too ready to succumb to his antagonists. He obtained valuable manuscript materials from Lord Portsmouth, brooded over the subject for more than twenty years, and in 1855 published a greatly enlarged work, in two volumes, under the new title of "Memoirs of the Life, Writings, and Discoveries of Sir Isaac Newton." Of which a critic, none too friendly, in the London Athenæum, has said: "This work, with all its faults, is a noble monument to Newton's memory and a pillar of fame to the writer." And in the recent struggle to divide with Pascal the honors of the discoverer of universal gravitation, who can doubt which side Brewster took, or be surprised that the venerable survivor of many hard-fought battles entered into the conflict with all the vigor of youth?

The title of one of Brewster's recent publications, "More Worlds than One, the Creed of the Philosopher and the Hope of the Christian," is characteristic of his general tone of thought and argument, and reminds us that he was originally destined for the Christian ministry, and had been licensed to preach in the Church of Scotland. At the University of Edinburgh, from which he received the honorary degree of A. M. in 1800, he enjoyed the valuable instruction and friendship of John Robison, John Playfair, and Dugald Stewart. In 1799, at the instance of his intimate friend, afterwards Lord Brougham, he studied Newton's investigations on the Inflection of Light, and repeated his experiments. But the discovery by Malus, in 1808, of the Polarization of Light fired him with new ardor in the pursuit of physical optics, and determined his future career. In 1815, during Professor Playfair's visit to the Continent, Brewster took his place in the University as Lecturer upon Natural Philosophy.

A literary and scientific career, so long, so laborious, so useful as that of Brewster, deserved the gratitude of his contemporaries, and he enjoyed it both at home and abroad. He received the degree of LL. D. from the University of Aberdeen, that of D. C. L. from Oxford, and that of A. M. from Cambridge. In 1808 he was chosen a member of the Royal Society of Edinburgh; and was its President from 1864 to the time of his death. In 1815 he was elected a Fellow of the Royal Society of London, and received from it the Copley Medal for his paper on the Polarization of Light by Reflection. In 1818 he won the Rumford Medal by his Discoveries relating to the Polarization of Light. In 1816 a prize was divided by the Institute of France between Brewster and Seebeck for their researches on the depolarizing structure of heated and compressed glass.

In 1825, Brewster was made a Corresponding Member of the Institute of France, and in 1849 he attained the high distinction of being chosen to succeed Berzelius as one of the eight Associate Members of the Academy of Sciences. He was called to preside at the twentieth meeting of the British Association for the Advancement of Science, held at Edinburgh in 1850. With honor to himself, and advantage to his country, he filled, in succession, the two highest literary positions in Scotland, being first Principal of the old University of St. Andrews, and afterwards, in 1859, Principal of the University of Edinburgh.

Since his death, a pension of £200 a year has been granted by the government to Lady Brewster, and soon a statue to the memory of her husband will stand in the city of Edinburgh.

Thus honored and trusted, lived, and labored, and died Sir David Brewster; a careful experimentalist, an elegant writer, a warm advocate of what he believed to be the truth. In him Christian faith was instructed by accurate science, and science was illuminated and inspired by Christian faith.

SIR WILLIAM LAWRENCE, an Honorary Member of the Academy, died on the 5th of July, 1867, aged 84. He was born at Cirencister, near Gloucester, England, in 1783, and was educated at the Classical School. In his seventeenth year he went to reside in the family of Mr. Abernethy, to whom he was apprenticed. His official connection with various hospitals began in 1801, when he was appointed Demonstrator of Anatomy at St. Bartholomew's. In 1828, having steadily advanced in reputation and honors, he succeeded Mr. Abernethy as Lecturer on Surgery in that Hospital. In 1814 he was elected Surgeon to the Eye Infirmary, and in 1815 Surgeon to the Royal Hospitals of Bridewell and Bethlem.

In 1865, having been in constant service in these institutions for more than sixty years, he resigned at the age of eighty-two.

Mr. Lawrence was Fellow of the Royal Society and Vice-President during the Presidency of the Duke of Sussex. He was a member of the French Institute, and of other learned and scientific associations. In 1831 he was elected President of the "Medico-Chirurgical Society," and, in 1858, Surgeon to the Queen.

It is unnecessary on this occasion to enumerate the long list of his works; suffice it to say that from the year 1801 he was constantly engaged in literary labors either in the form of contributions to various journals or of elaborate treatises. His translation of Blumenbach, with the addition of numerous notes and an introductory view of the classification of animals on the basis of anatomical structure, was published in 1807, and gave the first impulse, in England, to the study of comparative anatomy. He also contributed the anatomical and physiological articles in Rees's Cyclopædia. In 1819 appeared the "Lectures on the Physiology, Zoölogy, and Natural History of Man." In this department, in England, there had previously been very little investigation, and this work excited great interest. It displays a vast amount of research and knowledge, and is eminent authority at the present day. Of the strictly professional works, the most important are the treatises on Diseases of the Eye, on Hernia, and his most recent work on Surgery.

The Treatise on Diseases of the Eye, comprising his own opinions and those of men distinguished in that department, is a learned and comprehensive exposition of the science of that period. The Treatise on Hernia, probably the most important of his works, was first published in 1806. It has passed through many editions, which were enriched by extensive observations in St. Bartholomew's Hospital. The name of Mr. Lawrence will be always identified with the progress of Surgical Science, and the treatise on this subject will remain a monument to his learning and industry.

The late Sir Benjamin Brodie remarks that he "never knew one who had a greater amount of information, not merely on matters relating to his profession, but on a great variety of other subjects."

"His personal appearance was striking and impressive; he had a tall, manly figure, and his head and features were models of intellectual beauty and power."

His learning, eloquence, and genial disposition made his fireside most attractive. He often expressed his admiration of our free institutions, and many Americans will remember his generous, self-sacrificing hospitality.

Pierre François Olive Rayer was born, March 7, 1793, of a respectable Bourgeois family, at Saint Sylvain, near Caen, France. After the necessary preliminary education, he commenced the study of medicine, and was graduated Doctor of Medicine, at the age of twenty-three, in Paris. He was a student and favorite pupil of M. Duméril. Among his contemporaries were Dupuytren, Corvisart, Velpeau, Louis, Larrey, Trousseau and others, who have made the present century such a brilliant epoch in the history of French medicine. He was doubtless stimulated by their example and labors to constant effort in his chosen career, but they owed as much to him as he to them.

Through persistent labor and conspicuous merit, he attained successively the highest professional and scientific positions. In 1825 he was appointed to the medical staff of the Hospital of Saint Antoine. In 1832 he was transferred to the Hospital of La Charité. He was selected by Louis Philippe as one of the consulting physicians of the Royal household; and in 1852 he was taken by the Emperor Napoleon into the medical service of the Imperial family. Rapidly winning the confidence of the community, he soon became known as one of the largest practitioners of medicine in Paris. He was elected into the Academy of Medicine in 1823; and in 1843 he became a member of the Academy of Sciences as the successor of M. Morel Vincté. In 1862 he was appointed to fill the newly created chair of Comparative Medicine, and about the same time was chosen Dean of the Medical Faculty of the University of Paris. He was President of the Central Committee of Public Hygiene, and also of the General Association of the physicians of France. In 1855 he was elected an Honorary Member of this Academy. Among the various marks of honor which the Emperor conferred upon him was that of Commander, and, when he resigned the place of Dean of the Faculty of Medicine, that of Grand Officer of the Legion of Honor. In connection with Bernard, Robin, Lebert, and one of our own associates, C. E. Brown-Séquard, he was one of the founders of the Society of Biology, — a society which has probably contributed of late years more than any other to a just and comprehensive study of life in all its manifestations. He was the animating spirit of this Society, and was most properly made its perpetual President.

But it is not the honors with which he was crowned, or the responsible posts which he filled, or the elevated social position to which he attained, that entitle M. Rayer to our especial regard. His best monument is to be found in his published works. Soon after his graduation he published a brief Summary of Pathological Anatomy. This was followed in a short time by memoirs on a variety of medical subjects, such as a note on the Coryza of Nursing Infants; a monograph on Delirium Tremens; a History of the Epidemic of Miliary Sweat, which prevailed in the Departments of Oise, and of the Seine and Oise, in 1821; and a number of smaller treatises. In 1835 he put forth a more elaborate work than any of the above memoirs. It was entitled "A Theoretical and Practical Treatise on Diseases of the Skin, founded on Original Anatomical and Pathological Researches." This was in two volumes, and was accompanied with an atlas of colored plates. The value of the work was attested by the appearance, in a short time, of a second edition, which was enlarged to three volumes, with a corresponding addition to the atlas of illustrations. At the time of its appearance, this work was a most important addition to Dermatology, and prepared the way for the minute and careful studies of later observers.

The function and diseases of the kidneys early attracted the attention of M. Rayer. The result of his studies in this direction appeared in what was the capital work of his life, and which he called, "A

Treatise on Diseases of the Kidneys, and their Relations to Diseases of the Bladder, the Prostate, and the Urethra." This was completed in three volumes, and was illustrated by a folio atlas of sixty colored plates. As soon as it appeared, it was received as the foremost book of its kind. It was acknowledged as an authority in this country and in England. Two separate translations of it into the German language proved the value which German observers set upon it. Aided by the microscope and the laboratory, later physiologists have gained a more accurate knowledge of the pathology and physiology of the kidneys than can be gathered from M. Rayer's work; but this does not detract from its value. It was a great addition to medical science.

Besides these labors, M. Rayer found time to investigate a department of pathology that before him was almost unknown, or at least unexplored, namely, that of Comparative Medicine. The chair of that name, which was established by the Medical Faculty of Paris in 1862, was immediately offered to him as the person best qualified to fill it. His monograph on glanders and farcy in the human subject is unique of its kind. The extent of his general knowledge of medicine is shown by the fact of his being one of the authors of the "Dictionary of Practical Medicine," a sort of medical encyclopædia in fifteen volumes. He was, moreover, a frequent contributor to various scientific journals, such as "Les Archives de Médecine Comparée"; "Les Mémoires de l'Académie des Sciences"; "Le Nouveau Journal de Médecine," etc.

It was said of M. Rayer, by one of his contemporaries, that "he was not only distinguished by the works which he produced, but by those which he inspired." The number of eminent men whose early studies he directed and encouraged, and whose fortunes he sometimes aided in most substantial ways, confirms the truth of this remark. Like Stahl and Boerhaave, he loved to surround himself with a group of youthful *savans*, whom he animated and guided. Claude Bernard, the ingenious and sagacious observer, who has contributed so largely to the advancement of physiology; Robin, who has justly been called the creator of French histology; and Littre, whose translation of Hippocrates and whose knowledge of historical medicine has earned for him so wide a renown, — all were encouraged, substantially aided, and often guided in their earlier and later studies by M. Rayer.

As a practitioner, he was one of the most successful of the French physicians. It was said of him that he was first among scientific physicians and also first among medical practitioners. His acquaintance with the works and original papers of the physiologists of the present century made him an acknowledged authority on physiological questions. Honest and frank in the expression of his views, when he had occasion to present them, he possessed the rare virtue of being able and willing to recognize and acknowledge an erroneous opinion of his own, whenever the error could be demonstrated. When we consider the extent and variety of his labors, — his private practice, his hospital attendance, his collegiate teaching, and his published writings, — we are surprised that one man could have found time to accomplish so much and so well.

M. Rayer died in Paris, September 10, 1867, at the age of seventy-four years and six months. The appreciation in which his services to science and medicine were held by his contemporaries was abundantly evinced by the numerous eulogies that were pronounced at the time of his death.

FRANZ BOPP, Professor of Sanskrit and of Comparative Philology in the University at Berlin, died on the 23d of October last, at the advanced age of seventy-six years. Among the philologists of the present century he was perhaps the foremost. Others of his contemporaries, especially of his countrymen, have shown not less remarkable talent, reached as high a degree of scholarship, and won an equal distinction, in various departments of the study of languages and literatures; but to him belongs the peculiar and transcendent honor of having inaugurated and given development to a new science, — that of the historical investigation of human speech. It is an honor of which he can be in no measure deprived; even though it be shown that some of his discoveries had been partially anticipated by others, or, on the other hand, that the times were ripe for the appearance of such a science, which must have sprung up and gained a rapid growth without him. For, as a matter of fact, it was he who turned to profitable account the scattered and imperfect perceptions of others, who improved and made fruitful their methods of research, who took advantage of the favorable conditions of the times, and with steady devotion, clear insight, and admirable skill, laid a foundation and reared a structure which others may indeed improve and extend, but can never destroy.

Bopp was born at Mayence, in Bavaria, on the 14th of September, 1791, and received his early education at Aschaffenburg, where the influence especially of Windischmann directed his attention to Oriental studies. At the age of twenty-one he went to Paris, drawn thither by the attraction of the collections of Oriental manuscripts in the great library. Paris was then incontestably the centre of Oriental study for Europe; even a little school of Sanskrit philology had arisen there, having for its first teacher Alexander Hamilton, an English East-Indian, one of Napoleon's prisoners after the breach of the peace of Amiens. To the study of the Sanskrit, and to the comparison of Indo-European languages to which it so naturally led, Bopp soon began especially to devote himself, — a devotion which he was never to relax until stricken down by his last illness. More than any other person, he aided to make the Sanskrit accessible to European scholars, by a series of grammars, texts, and glossaries, which, though they have their defects, are even now among the most valuable parts of the apparatus of study within reach of the learner. With him, however, the Sanskrit was the thing of subordinate consequence, the handmaid of comparative philology; into the history, antiquities, and literature of India he never cared to penetrate very far, nor did he strive to become a profound Sanskrit scholar, to master all the niceties of its structure and usages. Even before leaving Paris for a further season of study in England, he prepared and published, in 1816, the forerunner of his great Comparative Grammar, a little volume entitled "The Conjugation-System of the Sanskrit Language, in comparison with that of the Greek, the Latin, the Persian, and the German Languages." In this he sketches the principal features of his whole system, as afterwards developed. He assumes as demonstrated the truth, pointed out by many before him, of the relationship of the Sanskrit with the other tongues named, not as their mother, but as their older sister, but in the use he makes of this truth he had no predecessor; he would fain derive from their comparison their history and the genesis of their words and forms. He takes up their grammatical mechanism as an object in itself worthy of study, and sure to lead, when comprehended, to valuable results for other departments of knowledge. Both in his distinct apprehension of the work to be done, and in the clearness, good sense, and acuteness of the methods of research he devised and employed, in the geniality and fruitfulness of his whole mode of labor, he so far surpassed all who had gone before him, and furnished an example and model for those who should come after him, as to become the founder of the science. It is, then, not without reason, that the fiftieth anniversary of the date affixed to the preface of the "Conjugation-System" was celebrated just two years ago (May 16, 1868) in Berlin, as the jubilee of Comparative

Philology, by the establishment of a Bopp fund, of which the income should be forever devoted to the encouragement and aid of researches in this department of knowledge. The endowment, amounting to over ten thousand thalers, was made up by the contributions of scholars and friends of learning in all parts of the world, — those of our own country, among the rest, furnishing their mite to swell the sum.

On his return to his native country, Bopp was nominated by the Bavarian government to a professorship in the University of Würzburg; but the handful of pedants who composed the senate of that institution resolved that the studies which he represented had no claim to a place in it, and respectfully declined to ratify the appointment. But the next year (1821) he was called to a vastly higher and wider sphere of labor in the Berlin University, in connection with which and with the Academy of Sciences of the same city his chief literary activity was henceforth exercised.

The most important of his works, by far, is his Comparative Grammar, of which the first edition began to appear in 1833 and reached its completion in 1849. A second edition, in three volumes, considerably modified and extended, was commenced in 1857 and finished in 1861. The former was long since translated into English; of the latter, M. Bréal is now putting forth a French version. Into any extended description or criticism of this great work we are not called upon to enter. It is a rich mine of observations and conclusions, the compendium of what was done for the new science by its founder. We must not regard it, however, as in all parts of equal merit and authority. Bopp lived long enough to see his science carried further, in many points, by his followers than by himself. At the same time, he was not one who readily assimilated the results won by others. The later years of his life were comparatively unfruitful of valuable additions to science; and when at length he passed away, it was rather the presence of the man than the work of the scholar that was missed by us.

August Boeckh, the illustrious philologist, long a member of the Academy, died in Berlin, August 3, 1867, aged 82. He was born in Karlsruhe, November 24, 1785, and had the misfortune to be left an orphan at the age of three. From his sixth to his eighteenth year he attended the gymnasium at Karlsruhe, where he went through an unusually thorough course of study for the times, embracing the classics, mathematics and physics, and philosophy.

Thus prepared for a more independent course of study, Boeckh left

Karlsruhe in 1803 for the University of Halle, to which he was drawn by the great reputation of Friedrich August Wolf. His original intention was to study theology and philology together. But his interest in the latter study soon led him to discard theology and to devote himself to philology as his professional study, combining, however, with it philosophy under Schleiermacher, — a combination that gave a turn to his first literary undertaking on the Minos and the Laws of Plato.

On leaving Halle in 1806, Boeckh began as a teacher in Berlin. But the fortunes of the war then raging soon forced him to leave Prussia and go to Heidelberg. His rapid academic advancement is an evidence of the precocity of his genius. He was appointed Extraordinary Professor at Heidelberg in 1807, Ordinary Professor in 1809, and in 1811, when the University of Berlin was founded, he received a call as Professor of Eloquence and Ancient Literature.

From 1811 to 1867 — fifty-six years — he lived in Berlin the uneventful life of a scholar, dividing his time between study, his duties as Professor and head of the Philological Seminary, and various other charges for which his extraordinary aptitude for affairs fitted him. He was repeatedly Rector of the University. In the sessions of the Academy he took a lively interest, and his communications to that body have become a standard part of philological literature.

Both in his elaborate books and in the more fugitive pieces and courses of lectures which laid the groundwork to these books, Boeckh exhibited two qualities not often united, — a faculty for details and a comprehensive grasp of the general subject. He had a perfect genius for details. No matter what the subject was that interested him, — and in his long and manifold studies there were few things connected with ancient life which did not interest him, — whether it was a question of weights and measures, of finance, of grammar, of metres, of orthography, or astronomy, — he followed the thing out with a microscopic eye into its minutest ramifications, weighing carefully all the evidences of the text and studying the credibility of his witnesses. In his earlier years he kept copious notes and *adversaria*. Later in life he gave them up, trusting entirely to his memory. Under such a load of erudition a less happily balanced mind would have staggered and stumbled. But in combination and arrangement Boeckh was equally at home. With the insight of genius he looked at the tangled and complicated masses, and order sprang out of chaos. Grasping the leading idea, he carried it out consistently to the end, and his intimate familiarity with the whole range of ancient thought and action enabled him to shed a flood of light on all the parts.

To enumerate the works of Boeckh would take us far beyond the bounds of this brief notice. As Professor of Poetry and Ancient Literature, the representative and spokesman of the University, he was officially bound to deliver orations on public occasions and to write the University programmes. The collection of Orations and Dissertations published in three volumes from 1858 to 1866 gives but little idea of his gigantic industry. Of his larger books we need hardly name his Pindar, his Collection of Greek Inscriptions, and his Public Economy of Athens.

While Boeckh was known to foreign countries by his works, at home he exerted an influence equally great by his personal teachings. In his younger days he lived in intimate relations with his pupils, quite carrying out the old academic idea of Master and Disciples, now among the traditions of the past. As the University grew and his own audiences became larger, this was no longer possible, and his connection with the younger generation was confined to his labors in the Seminary and his Lectures. The Lectures, which were partly exegetical and partly systematic, — among the latter the courses on Antiquities and on the Encyclopædia of Philology being particularly prized, — were marked by the same minuteness of detail and the same general grasp which characterized his books. His style and delivery were plain and to the point, giving an impression of immense shrewdness and reserve power, and the earnestness of his discourse was every now and then lighted up by a flash of homely drollery.

Grown old among his books, he celebrated the sixtieth anniversary of his Doctorate, March 15, 1867, and received such an ovation from scholars, citizens, and crowned heads as is never given to a scholar out of Germany and seldom equalled there. Shortly after, he died.

KARL JOSEPH ANTON MITTERMAIER, born at Munich, August 5, 1787, died at Heidelberg, August 28, 1867, at the age of eighty, after a life of zealous, honorable, and learned labor in the cause of science and humanity. In 1819 he became a Professor of Law at Bonn, whence, in 1834, he was transferred to Heidelberg. In 1859 he celebrated his professional jubilee. For more than half a century he was well known as a teacher and writer on subjects of great interest in civil and criminal law. His learning was not absorbed in the past, but put to constant service in behalf of the present and the future. In this best sense he was a reformer. As a public man at times in middle life, he held the position of a moderate liberal, and distinguished himself in furthering reformatory and progressive legislation. He favored oral and public procedure in the civil courts, the separation of judicial from administrative functions, and the abolition of corporal punishment as a means of eliciting the truth; and he pronounced himself a friend to the freedom of the press. But his public life terminated almost twenty years before his death. As an author, he is widely, though by no means exclusively, known as a criminalist. And he was remarkable for the assiduity and activity with which, by reading, correspondence, and travels, he made himself contemporary with whatever in criminal and penal legislation and procedure was going forward in different countries. In this department of comparative law he was an adept and a leader. The extent of his researches furnished a basis for general conclusions, and his liberal spirit turned them readily into the path of reform. In 1851 he published an important work on criminal procedure in England, Scotland, and North America. Some months before his death this treatise appeared in a French translation, enriched with the copious fruits of the author's study and personal observation in the interval. In 1865, at the age of seventy-seven, he put out a work (since translated into several languages) in which, surrendering his early opinion on capital punishment, he declared himself in favor of its total abolition. The enlargement of this work by the results of indefatigable inquiries in Europe and the United States was prevented only by his death. These unpublished collections have been deposited in the library of the University of Heidelberg.

Since the last annual meeting the Academy has received an accession of eleven new members, as appears in the following list.

Of Resident Fellows there have been elected, —

Dr. Charles E. Brown-Séquard in Class II., Section 3.
Com. John Rodgers, U. S. N., in Class I., Section 4.
Edward C. Pickering in Class I., Section 3.
James M. Crafts in Class I., Section 3.

Of Associate Fellows, —

Rowland G. Hazard in Class III., Section 3.
Dr. J. Lawrence Smith in Class I., Section 3.
Hon. Horace Binney in Class III., Section 1.
Hon. Daniel Lord in Class III., Section 1.

Of Foreign Honorary Members we have elected, —

Major-General Edward Sabine, in place of Admiral Duperrey, in Class II., Section 1.

M. Chevreul in Class I., Section 3.

One of our members, Dr. C. H. F. Peters, has been transferred from the list of Resident Fellows to that of Associate Fellows in Class I., Section 2.

Five hundred and ninety-seventh Meeting.

June 23, 1868. — ADJOURNED ANNUAL MEETING.

The PRESIDENT in the chair.

The memoirs of the Foreign Honorary Members deceased during the year were read from the Council's Annual Report by the Corresponding Secretary and Professor Lovering.

Nominations by the Council were read.

The Statute Meeting for August was adjourned to the second Tuesday in September, and a Special Meeting was appointed for the first Tuesday in July.

Five hundred and ninety-eighth Meeting.

July 7, 1868. — SPECIAL MEETING.

The PRESIDENT in the chair.

The President called the attention of the Academy to a circular letter announcing the celebration at Berlin of the fiftieth anniversary of Ehrenberg's Doctorate.

On the motion of Dr. Bowditch the following vote was passed: —

"Resolved that this Academy desires to express their sincere congratulations to Dr. Ehrenberg for his long and honorable services in the cause of science, and requests their President, Dr. Asa Gray, and Professor Joseph Lovering, to represent them on this interesting occasion."

Professor Lovering made a communication on the application of Electricity to maintaining the vibrations of a tuning-